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Original scientific paper

Effect of Trust in Metaverse on Usage Intention through Technology Readiness and Technology Acceptance Model

Seong-Ha JEONG, Ha-Kyun KIM*

Abstract: The fourth industrial revolution enhanced the development of information technology in all fields and opened up possibilities. A lot of attention is focused on the future possibilities opened up by the metaverse, the core of information technology. Metaverse will have a big impact on reality and the near future. Metaverse is a virtual world that fuses physical and digital reality. Various commerce such as healthcare, instruction, business, and land are foundation to utilize metaverse knowledge in their regular work. There is a series of processes in the stage where newly developed technology is introduced to general users. In order for a new technology to become a user-friendly technology, it is necessary to verify the technology. It can be said that it is hard to derive the operator's usage intention in a state where user trust for new technology is not verified. In the metaverse environment, it is necessary to first verify the trust for new technologies. This study is expected to understand usage intention through the process of checking trust in metaverse, and to become basic data for the popularization of metaverse knowledge. The meaning of this research is to inspect the influence relationship of trust in metaverse on usage intention through Technology Readiness (TR) and Technology Acceptance Model (TAM). Statistical package (SPSS23.0) was used for basic numerical examination of the questionnaire. Hypothesis test was performed using the structural equation package Smart PLS 3.0. Discriminant validity and concentration validity of the questionnaire were verified. As parameters that trust in metaverse effects, TR and TAM were set. As factors constituting TR, it was separated into optimism, innovativeness, discomfort, and insecurity. The TAM is separated into perceived usefulness and perceived ease of use. The outcomes of the study are as follows. First, trust in metaverse had a significant effect on TR. Second, TR was partially adopted in the TAM. Innovativeness and perceived usefulness had no significant effect. Third, TAM significantly influences usage intention. Fourth, perceived ease of use did not significantly influence perceived usefulness.

Keywords: metaverse; technology acceptance model (TAM); technology readiness index (TRI); trust; usage intention

1 INTRODUCTION (Introductory remarks)

The expansion of information knowledge has created the possibility of implementing what humanity thinks and imagines. As one of the recent advances in information technology, a lot of attention is focused on the future possibilities that metaverse will open. Metaverse will have a great impact on society in the near future [1]. The literary origins of the metaverse began with Neal Stephenson's novel Snow Crash that was used informally for 30 years [2]. The virtual world of metaverse is currently undergoing an important renaissance. Various commerce such as education, business, healthcare, are foundation to utilize metaverse technology [3]. Metaverse is a digital universe that can be accessed through a computer-generated situation. It is built on the fusion of enhanced physical and ordinal realities. It is an extended and synchronized environment statement that consents other users to segment their knowledge [4]. Metaverse has the ability to create the next generation of the Internet. This technology connects the user's real existence in a three-dimensional space, providing the possibility of interaction and collaboration. It can be said that standardization of metaverse is an important factor for interaction and cooperation. Equipment and functions are organized according to standards so that the metaverse can interact [5]. In the 3D digital space that exists in metaverse, users can communicate with others through avatars similar to themselves. The metaverse can interact with its counterpart and its surroundings, which also replicates the physical world [6]. Metaverse is creating new value. Through a virtual world that transcends time and space, it has the potential to change society. It can be said that the potential of metaverse is very high. Additionally, the more immediate curiosity elicited by the Metaverse that has engrossed public attention has been challenged and questioned. This is because the Metaverse first appeared at a period when humanity was facing more difficulties and uncertainty as a result of the COVID-19 epidemic. The wide-ranging common Scientific and technological visions that are commonly brought about by scientific and technological advances have both positive and negative effects on society [1]. This study analyzed focusing on studies and cases related to metaverse technology conducted in 2022. A platform study using metaverse technology and blockchain technology proved that various uses that combine shopping and customer experience are possible [7]. This means that new customer experiences are realized through metaverse in digital marketing tools and live streaming shopping platforms. In addition, in the educational analysis study, a new future education vision was presented as education using metaverse technology [8]. It has been shown that online remote education can present a new paradigm for education. Therefore, it was possible to confirm the possibility that metaverse technology is used in various fields. Although many studies have suggested the possibility of using metaverse technology in various fields, research on the willingness to accept new technologies from the perspective of metaverse technology users is still insufficient. The primary objective of this study is to generate new knowledge and gain a better understanding of the Metaverse and its future challenges. The preceding research on metaverse is continuously conducted only on engineering research, and research on the social sciences is still insufficient. Metaverse technology, which can be applied in various fields, is still in the introduction stage, and trust for this technology must be defined to bring about popular diffusion. In order for metaverse technology to spread throughout society, trust in new technology must first be verified. Ultimately, it can be said that trust in metaverse is potentially closely related to users. Therefore, this study intends to suggest the development potential for the metaverse to be standardized as a popular technology from a social opinion of view.

This study investigated the relationship effect of trust in metaverse on TR (optimism, innovativeness, discomfort,

insecurity), TAM (perceived usefulness, perceived ease of use), and usage intention. Trust in metaverse is set by way of TR and TAM as parameters that affect usage intention.

This study was conducted for the general public who had experience in using metaverse to empirically verify the research model. An online survey (Naver survey) was conducted for two months from September 10, 2021 to November 10, 2021. A whole of 310 prints were recovered, and 298 were used for investigation. As for the measurement items, the inquiry form used in prior studies was reconstructed to fit the metaverse. All items were measured on a 7-point scale. For basic statistical analysis, the statistical package SPSS 22.0 was used. Concentrated validity, discriminant validity, and hypothesis testing were using the structural equation package Smart PLS 3.0. As a result, this study examines the complex interaction between the Metaverse as a form of Scientific and technological and the larger social context in which it exists. It focuses on the interconnected factors underlying its materialization, success, expansion, and evolution, as well as the key contentions, and uncertainties that have direct implications for its realization and acceptance. This study is an empirical study to create a social environment where general users can easily use the new technology called metaverse.

2 THEORETICAL BACKGROUND

2.1 Trust in Metaverse

Metaverse is a three-dimensional virtual world in which political, economic, cultural, and social activities exist, in which virtual reality exists. It is widely used as a meaning of a virtual world based on a daily life in which reality and unreality coexist [9]. The metaverse is divided into augmented life logging, realism, mirror worlds, and virtual reality according to the form of information and the space it is implemented in [10]. The four types of metaverse exist independently, but as the interaction accelerates, they evolve into a fusion form. In previous studies of Metaverse, the process of confirming trust in new technologies has been continuously studied. In order to use a new technology called metaverse, trust in this technology must first be confirmed. Trust refers to the attitude of positively evaluating the intentions or actions of others and wanting to trust the other person [11]. Trust plays a significant part in a person's decision to develop a long-term relationship with a particular brand, service provider, or product [12]. In order for the metaverse technology to be actively used in society, research on trust in metaverse should be conducted. In a study related to a new technology called blockchain technology, it was confirmed that trust and usage intention have an influence [13].

2.2 Technology Readiness (TR)

TR is a framework related to technology in general, and new technologies have both positive and negative aspects to humans. Technology readiness was advanced to understand consumers' use of new technologies and represent a tendency to embrace new technologies [14]. There are positive and negative aspects of technology founded on the concept of Technology Readiness Index through consumer reaction. TR was defined as personal disposition toward technology used to achieve specific goals at work and at home [15]. The connection between TR and TAM has been broadly deliberated. Technology readiness does not measure a user's ability to use technology, but reflects a set of beliefs about technology. Optimism and innovativeness were suggested as variables that positively influence technology acceptance. And discomfort and insecurity were suggested as negative influencing variables [14]. Many studies in the field of service and advertising have considered the TR of new technologies and developed new knowledge [16]. Previous research confirmed that technology readiness and technology acceptance model are influencing each other [17].

2.2.1 Optimism

Optimism is one of the important influence variables of TR, the positive thinking about technology and the trust that customers will make available flexibility, control, and efficiency in their lifetimes. This belief reduces the time required for activities or efforts to acquire and use new technologies, thereby increasing efficiency [17]. Users with a high level of Optimism have low resistance to new technologies. Optimists are more receptive to the current situation, simple to use, and not focused on side effects [18]. Therefore, a high level of optimism has effect on technology introduction.

2.2.2 Innovativeness

Innovativeness is one of the positive influence variables of technology readiness. It is a personal tendency to enjoy using new technologies. Innovativeness refers to the tendency to adopt new technologies before others and to view them as pioneers or users who can exert influence [19]. In previous studies, innovativeness was defined as the tendency of operators to learn and try new knowledge [20]. Through this process, users are encouraged to think innovatively and their motivation to experiment and accept new technologies increases. Like optimism, innovativeness is a function as mental enablers that promote the introduction of new technologies. Therefore, innovativeness and optimism are essential attitudes in the stage of introducing technology. These two positive attitudes promote technology adoption.

2.2.3 Insecurity

Insecurity is one of the negative influence variables of technology readiness. Insecurity is a sense of doubt in devices and uncertainty about how well new technology products work. People have distrust or doubts about safety and privacy related to new technology [21]. This stems from a lack of belief that the technology will work right. It is an undesirable encouragement on the use and diffusion of devices and hinders innovation by creating low expectations and skepticism about the use of technology. Users have tendency to avoid technology because of distress and doubt of the unfamiliar. Users are hesitant to adopt technology services with a high level of insecurity

[22]. Therefore, insecurity is a negative factor holding back technology adoption.

2.2.4 Discomfort

Discomfort is one of the negative influencing variables of technology readiness. It is the user's perception that the ability to use technology is insufficient and the feeling about the technology. Users feel that they do not have sufficient control over the new technology, and they feel that they need help from others in using the new technology [15]. The lack of ability to deal with new technologies and the idea of being controlled by technology discourage users. A high level of discomfort is a negative influence on the adoption of new technologies [22]. Insecurity and Discomfort are attitudes that negatively impact technology adoption. Information feedback to users who feel uncomfortable increases the convenience of using technology [23]. Therefore, if these two negative factors are eliminated, usage intention for the new technology is increased.

2.3 Technology Acceptance Model (TAM)

The TAM was founded on the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TRB). It is useful for predicting and explaining human behavior for new technologies [24]. Perceived usefulness and perceived ease of use were viewed in place of individual motivations as viewpoint in the direction of use and acceptance of new technology [25]. Attitude is the degree to which an individual is evaluated or evaluated favorably or negatively for behavior. It has been hypothesized that perceived usefulness and perceived ease of use are the major effects of an individual's opinion toward skill use and are therefore finally connected to real use [26]. The TAM is one of the greatest significant models to forecast and clarify end-user behavior and system use [23]. Previous studies showed that perceived usefulness and perceived ease of use of the TAM has significantly influenced usage intention [27].

2.3.1 Perceived Usefulness

Perceived usefulness mentions the degree to which it is predicted that the usage of innovative information expertise will make progress in the efficiency of the task. It is definitely a degree of the confidence that a technology provides benefits to its users. A positive attitude toward the system also increases the utilization rate [24]. In the study of information technology, it was defined as the grade to which one trusts that by means of a specific application will progress one's labor enactment [28]. Potential users are inclined to the usage or not usage of innovative technologies to the grade that they trust a given new technology is useful. The will to use an intelligence structure rests on two views: perceived usefulness and perceived ease of use [29].

2.3.2 Perceived Ease of Use

Perceived ease of use means the grade to which one trusts that information technology can be used easily without difficulty. It mentions the use of target technology or information technology without much physical or mental effort [24]. All other things being equal, new technologies perceived as easy to the usage are more expected to be chosen by operators. Perceived usefulness and perceived ease of use were regarded as important variables in determining usage intention. If employer senses that the structure is easy to be useful, the knowledge is useful [30]. They are ready to use the technology [31].

2.4 Usage Intention

Usage intention refers to the intention to use a product or tool to achieve a specific purpose. It began in the field of psychology to determine how human attitudes affect specific behaviors [32]. Usage intention is an essential process for expressing all behaviors and is determined before behaviors appear. In other words, it can be said that the user's attitudes and beliefs are the probability of being transferred to an action or the possibility of being transferred to an action [33]. Early usage intention was mainly used in research on Technology Acceptance Model (TAM) [37]. In another study, usage intention was defined as the degree to which one wants to reuse and the degree to which another person wants to use the company or service [34]. Therefore, it can be said that usage intention is determined dependent on whether the user's perception is positive or negative.

3 METHODOLOGY

This study was conducted for the general public who had experience in using metaverse to empirically verify the research model. In addition, the surveyor's error was reduced by providing a sufficient explanation of the metaverse technology. The online survey was conducted to obtain a random general sample. They agreed to use the survey for research purposes and to discard all personal information after completing the research. The questionnaire was composed of 4 independent variables, 20 parameters, and 3 dependent variables, and the demographic questionnaire was composed of 5 questions. An online survey (Naver survey) was conducted for two months from September 10, 2021 to November 10, 2021. A whole of 310 prints were recovered, and 298 were used for investigation. The demographic results are as follows: 183 males and 115 females. Age showed the largest percentage of people aged 30-39 with 31.2%. Education was surveyed with 107 high school graduates and 103 college graduates with 34.6%. In Occupation, White-collar accounted for 27.9% with 83 people. Anual Income showed 29.9% of $10000-$20000 prices. As for the measurement items, the inquiry form used in prior studies was reconstructed to fit the metaverse. All items were measured on a 7-point scale. Item 1 was configured to be strongly disagree, and item 7 was configured to be strongly agree. For basic statistical analysis, the statistical package SPSS 22.0 was used. Concentrated validity, discriminant validity, and hypothesis testing were using the structural equation package Smart PLS 3.0. Through the structural model, the path coefficient, t-statistics, and coefficient of determination (R2) results were derived between the variables of the research model.

3.1 Research Design
3.1.1 Research Model

The Technology Readiness and Acceptance Model (TRAM) is a grouping of TR theory and AM theory. There are also a number of studies that extend the TAM to pay off for the limitations of the TAM [24]. The association among these two variables was clearly and concisely derived. To study the user's reaction to a new technology called metaverse, we used TRAM. In order to secure the independence of the two models, TR and TAM were selected as parameters, respectively. It is a meaningful study in analyzing the direct influence relationship between each variable. Therefore, the following research model is proposed to investigate how trust in metaverse affects usage intention.

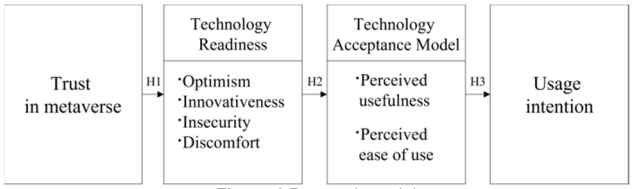

Figure 1 Research model

3.2 Research Hypothesis
3.2.1 Hypotheses about Trust in Metaverse and Technology Readiness

Users who use new technology have distrust and anxiety about this technology. There is a need for tools to measure the personality and attitudes of individuals using technology. This study adopted technology readiness to analyze people's dispositions and attitudes toward the metaverse. Optimism and innovativeness are motivating factors for ability. Insecurity and discomfort are factors that reduce readiness for ability [19]. In order to increase technology readiness, it is necessary to identify the relationship of trust on positive and negative factors. Trust has a significant effect on optimism, innovativeness, insecurity, and discomfort of technology readiness [35, 36]. The hypotheses regarding trust in metaverse and technology readiness are as follows.

Hypothesis 1-1: Trust impacts optimism positively.

Hypothesis 1-2: Trust significantly impacts innovativeness.

Hypothesis 1-3: Trust significantly impacts insecurity.

Hypothesis 1-4: Trust significantly impacts discomfort.

3.2.2 Hypotheses about Technology Readiness and Technology Acceptance Model

TR and TAM are closely related. In several studies, the validation process for the use of new technologies frequently used two tools.

Optimism: Optimism is a confident interpretation of technology and the confidence that it increases individuals' direction, flexibility and effectiveness. Optimism represents a confident attitude toward technology and is a motivating factor contributing to TR.

Hypothesis 2-1-1: Optimism impacts perceived usefulness positively.

Hypothesis 2-1-2: Optimism significantly impacts perceived ease of use.

Innovativeness: Innovativeness is defined as follows: The tendency to become technology pioneers and thought leaders. Innovativeness indicates a positive attitude toward technology and is a motivating factor contributing to technology preparation.

Hypothesis 2-2-1: Innovativeness significantly impacts perceived usefulness.

Hypothesis 2-2-2: Innovativeness significantly impacts perceived ease of use.

Insecurity: Insecurity is defined as follows. It is a suspicion of technology that stems from uncertainty about its capacity to function appropriately and worries about its possibly damaging significances. Insecurity, which represents a negative attitude towards technology, is a deterrent to technology readiness.

Hypothesis 2-3-1: Insecurity will have a significant impact on perceived usefulness.

Hypothesis 2-3-2: Insecurity will impact perceived ease of use positively.

Discomfort: Discomfort is defined as follows. Discomfort is an absence of domination over technology and a sense of being overawed. Discomfort, which indicates a negative attitude towards the technique, is deterrent to the technique preparation.

Hypothesis 2-4-1: Discomfort impacts perceived usefulness positively.

Hypothesis 2-4-2: Discomfort impacts perceived ease of use positively.

3.2.3 Hypotheses about Technology Acceptance Model and Usage Intention

TAM has been studied to forecast and describe the user acceptance and receive information technology and new technologies. In the extended model of TAM, there is a limit to efficiently grasping the user's aim to use.

Hypothesis 3-1: Perceived usefulness will influence usage intention in a positive way.

Hypothesis 3-2: Perceived ease of use will be a significant impact on usage intention.

Hypothesis 4: Perceived ease of use will be a significant impact on perceived usefulness.

3.3 The Operational Definition of Variables

Tab. 1 expressions operational meanings of variables used in this search.

4 EMPIRICAL ANALYSIS AND RESULTS
4.1 Characteristics of Respondents

This study was conducted for the general public who had experience in using metaverse to empirically verify the research model. An online survey (Naver survey) was conducted for two months from September 10, 2021 to November 10, 2021. A whole of 310 prints were recovered, and 298 were used for investigation. Tab. 2 summarizes the characteristics of the sample.

Table 1 The operational definition of constructs

Variable	Operational Definition	Items	Reference
Trust	An extent to believe that they would trust and continue to trust the metaverse	- Metaverse technology policy on how it would use any personal information about me makes me feel that the technology is trustworthy. - Metaverse technology policy with respect to how they will share my personal information with third parties about me makes me feel that the technology is trustworthy. - The ability to access my personal information to ensure that it is accurate and complete makes me feel that Metaverse technology is trustworthy. - Security rules in metaverse platform would help me be more confident regarding the use of Metaverse technology.	[30]
Optimism	Believing in the ability of technology to give people in their daily lives more control, flexibility, and efficiency in the metaverse.	- Metaverse technology will help improve the quality of life. - I think Metaverse technology will give you a chance to live. - I prefer Metaverse technology.	[14, 15]
Innovativeness	Personal tendency to enjoy using new technologies of metaverse.	- I think Metaverse technology will strengthen relationships with colleagues. - I often look up Metaverse technology. - I think I have various knowledge of Metaverse technology.	[14, 15]
Insecurity	Distrusting the new technology of metaverse, not to believe the security and privacy considerations.	- I think there is an appropriate technical environment for Metaverse technology. - Appropriate policy guidelines are in place to support Metaverse technology. - Stable support for using Metaverse technology has been established. - Metaverse technology poses financial risks. - There is a fear of learning Metaverse technology.	[14, 15]
Discomfort	Not believing the desire for control and a feeling of being overburdened of metaverse.	- Metaverse technology is an unfamiliar work environment for me. - I don't trust the Metaverse technology environment too much. - Metaverse technology won't help me in the long run.	[14, 15]
Perceived Usefulness	A person has confidence in that using metaverse will be unforced.	- Metaverse technology increases productivity. - Metaverse technology improves efficiency. - Metaverse technology makes sharing data easier.	[24]
Perceived Ease of Use	An extent to believe that metaverse can improve his or her life.	- Metaverse technology has the flexibility to interact. - I can use metaverse technology skillfully. - Metaverse technology is easy to use.	[24]
Usage Intention	An extent to believe that they would use and continue to use metaverse.	- I will continue to use metaverse technology. - I will recommend metaverse technology to others. - Metaverse technology will be considered when using the fourth industrial technology.	[30, 35]

Table 2 Characteristics of respondents (n = 298)

Characteristics		Responses	Percentage
Sex	Male	183	61.4%
	Female	115	38.6%
Age	20-29 years	73	24.5%
	30-39 years	93	31.2%
	40-49 years	61	20.5%
	50-59 years	44	14.8%
	60 years or more	27	9.0%
Education	High School	107	35.9%
	College/University	103	34.6%
	Graduate School	88	29.5%
Occupation	Student	71	23.8%
	White-collar	83	27.9%
	Blue-collar	55	18.5%
	Professionals	41	13.8%
	Others	48	16.0%
Annual Income	0-$10000	84	28.2%
	$10000-$20000	89	29.9%
	$20000-$30000	66	22.1%
	$30000 or more	59	19.8%

4.2 Reliability and Internal Consistency Results

As for the measurement items, the inquiry form used in prior studies was reconstructed to fit the metaverse. All items were measured on a 7-point scale. For basic statistical analysis, the statistical package SPSS 22.0 was used. Concentrated validity, discriminant validity, and hypothesis testing were using the structural equation package Smart PLS 3.0. Concentrated validity exists in Tab. 3 and discriminant validity in Tab. 4.

Table 3 Reliability and internal consistency results

Factors	Items Name	Factor Loadings	AVE	Composite Reliability (CR)	Cronbach's Alpha
Trust	TR1	0.836	0.676	0.893	0.841
	TR2	0.822			
	TR3	0.850			
	TR4	0.768			
Optimism	OM1	0.830	0.702	0.867	0.791
	OM2	0.856			
	OM3	0.828			

Table 3 Reliability and internal consistency results (continuation)

Factors	Items Name	Factor Loadings	AVE	Composite Reliability (CR)	Cronbach's Alpha
Innovativeness	IV1	0.755	0.530	0.771	0.659
	IV2	0.744			
	IV3	0.760			
Insecurity	IS1	0.799	0.508	0.937	0.769
	IS2	0.746			
	IS3	0.758			
	IS4	0.764			
	IS5	0.792			
Discomfort	DI1	0.843	0.632	0.836	0.706
	DI2	0.784			
	DI3	0.846			
Perceived Usefulness	PC1	0.880	0.734	0.892	0.819
	PC2	0.861			
	PC3	0.829			
Perceived Ease of Use	PER1	0.809	0.716	0.883	0.802
	PER2	0.831			
	PER3	0.896			
Usage Intention	UI1	0.875	0.694	0.872	0.781
	UI2	0.939			
	UI3	0.782			

Table 4 Pearson correlations and discriminant validity

Features	1	2	3	4	5	6	7	8
TR	**0.822***							
OM	0.539	**0.728***						
IV	0.615	0.665	**0.838***					
IS	0.528	0.711	0.777	**0.713***				
DI	0.502	0.525	0.639	0.672	**0.795***			
PC	0.538	0.620	0.807	0.765	0.698	**0.857***		
PER	0.416	0.675	0.543	0.728	0.700	0.622	**0.846***	
UI	0.541	0.645	0.670	0.631	0.632	0.669	0.583	**0.833***

4.3 Validation of the Research Model

The structural equation model was verified using Smart PLS 3.0. Through the structural model, the path coefficient, t-statistics, and coefficient of determination (R2) results were derived between the variables of the research model.

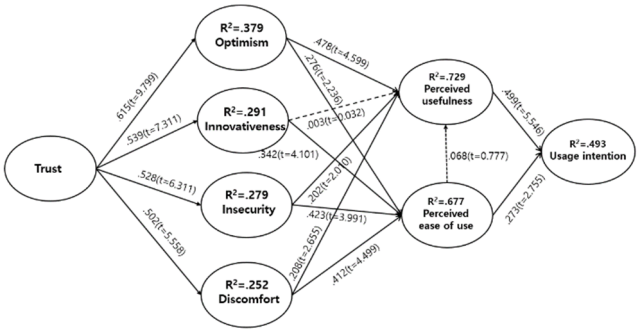

Figure 2 Path analysis for the research model

Hypothesis H1-1 was accepted. There was a statistically significant relationship (H1-1; β = 0.615, t = 9.799, p < 0.05). Trust influenced optimism. Hypothesis H1-2 was accepted. There was a statistically significant relationship (H1-2; β = 0.539, t = 7.311, p < 0.05). Trust influenced innovativeness. Hypothesis H1-3 was accepted. There was a statistically significant relationship (H1-3; β = 0.528, t = 6.311, p < 0.05). Trust had an impact on insecurity. Hypothesis H1-4 was accepted. There was a statistically significant relationship (H1-4; β = 0.502, t = 5.558, p < 0.05). Trust had an impact on insecurity.

Hypothesis H2-1-1 was accepted. There was a statistically significant relationship (H2-1-1; β = 0.478, t = 4.599, p < 0.05). Optimism influenced perceived usefulness. Hypothesis H2-1-2 was accepted. There was a statistically significant relationship (H2-1-2; β = 0.276, t = 2.236, p < 0.05). Optimism influenced the perceived ease of use. Hypothesis H2-2-1 was rejected. There was no statistically significant relationship (H2-2-1; β = 0.003, t = 0.032, p > 0.05). Innovativeness did not affect perceived usefulness. Hypothesis H2-2-2 was accepted. There was a statistically significant relationship (H2-2-2; β = 0.342, t = 4.101, p < 0.05). Innovativeness affected the perceived ease of use. Hypothesis H2-3-1 was accepted. There was a statistically significant relationship (H2-3-1; β = 0.202, t = 2.010, p < 0.05). Insecurity affects perceived usefulness. Hypothesis H2-3-2 was accepted. There was a statistically significant relationship (H2-3-2; β = 0.423, t = 3.991, p < 0.05). Insecurity had an impact on the perceived ease of use. Hypothesis H2-4-1 was accepted. There was a statistically significant relationship (H2-4-1; β = 0.208, t = 2.655, p < 0.05). Discomfort affected perceived usefulness. Hypothesis H2-4-2 was accepted. There was a statistically significant relationship (H2-4-2; β = 0.412, t = 4.499, p < 0.05). Discomfort affected the perceived ease of use.

Hypothesis H3-1 was accepted. There was a statistically significant relationship (H3-1; β = 0.499, t = 5.546, p < 0.05). Perceived usefulness affected usage intention. Hypothesis H3-2 was accepted. There was a statistically significant relationship (H3-2; β = 0.273, t = 2.755, p < 0.05). Perceived ease of use affects usage intention.

Hypothesis H4 was rejected. There was no statistically significant relationship (H4; β = 0.068, t = 0.777, p > 0.05). Perceived ease of use affects perceived usefulness.

Table 5 Hypothesis testing of model

Paths	Estimate	*t*-statistics	Hypothesis Results
H1-1: Trust → Optimism	0.615	9.799***	Supported
H1-2: Trust → Innovativeness	0.539	7.311***	Supported
H1-3: Trust → Insecurity	0.528	6.311***	Supported
H1-4: Trust → Discomfort	0.502	5.558***	Supported
H2-1-1: Optimism → Perceived Usefulness	0.478	4.599***	Supported
H2-1-2: Optimism → Perceive Ease of Use	0.276	2.236*	Supported
H2-2-1: Innovativeness → Perceived Usefulness	0.003	0.032	Not Supported
H2-2-2: Innovativeness → Perceive Ease of Use	0.342	4.101***	Supported
H2-3-1: Insecurity → Perceived Usefulness	0.202	2.010*	Supported
H2-3-2: Insecurity → Perceive Ease of Use	0.423	3.991***	Supported
H2-4-1: Discomfort → Perceived Usefulness	0.208	2.655**	Supported
H2-4-2: Discomfort → Perceive Ease of Use	0.412	4.499***	Supported
H2-1-2: Perceived usefulness → Usage Intention	0.499	5.546***	Supported
H2-1-2: Perceived ease of use → Usage Intention	0.273	2.755**	Supported
H2-1-2: Perceive Ease of Use → Perceived Usefulness	0.068	0.777	Not Supported

*Probability level $p < 0.05$, **$p < 0.01$, ***$p < 0.001$

5 DISCUSSIONS

This study aims to investigate how trust in metaverse affects usage intention through TR (optimism, innovativeness, discomfort, insecurity) and TAM (perceived usefulness, perceived ease of use). It is an empirical study. To this end, the existing literature on trust, TR, TAM, and usage intention has been compiled. In addition, research models and research hypotheses were established based on previous studies, and these were empirically verified.

The experimental analysis results of this research are summarized as trails. First, hypothesis H1 that trust in metaverse has a significant influence on TR was adopted. Second, hypothesis H2 that TR affects TAM was partially accepted. Innovativeness did not significantly affect perceived usefulness. Optimism, discomfort, and insecurity significantly influence perceived usefulness. Optimism, innovativeness, discomfort, and insecurity significantly influence perceived ease of use. Third, hypothesis H3 that the TAM has a significant effect on usage intention was adopted. Fourth, Perceived ease of use did not have a significant influence on perceived usefulness.

The whole meanings of this study are as follows. The development of Science and Technology (S&T) has accelerated the Fourth Industrial Revolution and is bringing about future changes in various fields. It is developing into an environment fused with the real world by realizing the environment imagined so far as a virtual world. At the heart of this technology is the Metaverse. This implies that the metaverse is implemented throughout society. In addition to politics, economy, society and culture, attempts are being made to apply metaverse technology in education and medical fields. A new future is coming, but research on the trust of this technology has been lacking.

6 CONCLUSIONS

The core of this study is to help the new technology to be established by studying the process of trust in metaverse affecting Usage Intention. TR and TAM set as parameters have already been used as tools for introducing new technologies in many previous studies. The difference between the previous study and this study was that innovativeness did not significantly influence perceived usefulness. This can be said to reflect the characteristics of the metaverse. This means that in the virtual world where digital and reality are fused, Innovativeness reduces the user's perceived usefulness. As the innovativeness of the real and virtual worlds increases, it does not affect the perceived usefulness. In order to increase the usage intent for metaverse technology, it is necessary to refrain from radical innovation. The fact that the perceived ease of use did not have a significant effect on perceived usefulness is another characteristic of the metaverse. If the factors constituting the virtual world are not sufficient, even if the perceived ease of use is high, it did not influence the perceived usefulness.

As a limitation of this study, it is regrettable that an in-depth study on one of the four types of metaverse was not conducted. In a follow-up study, there will be more valuable research if we study the most notable types in the metaverse. This study is meaningful in that it deals with the research on metaverse technology, which has been aggressively shown in the scientific field from the viewpoint of social science.

In future research, it will be a meaningful study if research on blockchain security technology and decentralized ownership of assets that make up the virtual world of the metaverse is conducted. Based on this study, new models for trust in metaverse, Technology Readiness, Technology Acceptance Model, and usage intention are proposed and empirically analyzed, thereby contributing to the development of metaverse technology.

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Contact information:

Seong-Ha JEONG, PhD Student
Pukyong National University, Graduate School of Information System,
45, Yongso-ro, Nam-gu, Busan, Republic of Korea
E-mail: vik8sh@naver.com

Ha-Kyun KIM, PhD, Professor
(Corresponding author)
Pukyong National University, Division of Business Administration,
45, Yongso-ro, Nam-gu, Busan, Republic of Korea
E-mail: kimhk@pknu.ac.kr